

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>James River.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>
Lynchburg, Va.	257	18	1.9	23	0.1	17-19	0.6	1.8
Richmond, Va.	110	12	0.7	24	-0.2	2, 9, 10, 12	0.2	0.9
<i>Alabama River.</i>								
Montgomery, Ala.	265	25	8.4	24	0.5	2	2.8	7.9
Selma, Ala.	212	35	9.8	25	0.5	3	3.3	9.3
<i>Coosa River.</i>								
Gadsden, Ala.	144	18	10.1	22	0.0	1	2.6	10.1
<i>Tombigbee River.</i>								
Columbus, Miss.	285	33	-0.2	17	-3.0	31	-2.3	2.8
Demopolis, Ala.	155	35	8.2	23	-1.5	2-6	1.2	3.7
<i>Black Warrior River.</i>								
Tuscaloosa, Ala.	90	38	14.5	21	-0.2	2-4	3.4	14.7
<i>Pedee River.</i>								
Cheraw, S. C.	145	27	20.4	23	2.0	31	5.4	18.4
<i>Black River.</i>								
Kingstree, S. C.	60	12	3.7	30, 31	1.3	11-13	2.5	2.4
<i>Lumber River.</i>								
Fair Bluff, N. C.	10	6	5.1	31	-0.4	9	1.7	5.5
<i>Lynch Creek.</i>								
Effingham, S. C.	35	12	12.1	29	2.5	7, 8	5.2	9.6
<i>Potomac River.</i>								
Harpers Ferry, W. Va. ...	170	16	2.0	28	0.1	19	1.1	1.9
<i>Roanoke River.</i>								
Clarksville, Va.	155	12						

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Sacramento River.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>
Red Bluff, Cal.	241	23	1.0	1-5	0.1	23-31	0.5	0.9
Sacramento, Cal.	70	25	13.8	1	10.0	31	11.6	3.8
<i>Santee River.</i>								
St. Stephens, S. C.	50	12	7.3	23-31	2.6	7	5.3	4.7
<i>Congaree River.</i>								
Columbia, S. C.	37	15	3.5	21, 22	1.5	{ 1-13, 15-19, 24-31 }	1.7	2.0
<i>Wateree River.</i>								
Camden, S. C.	45	24	22.5	22	4.0	2-4, 8	7.4	18.5
<i>Savannah River.</i>								
Augusta, Ga.	130	32	16.6	20	5.7	17	8.5	10.9
<i>Susquehanna River.</i>								
Wilkesbarre, Pa.	178	14	5.0	31	-1.0	1-27	-0.5	6.0
Harrisburg, Pa.	70	17	4.5	30	1.0	13, 15, 16	1.6	3.5
<i>Juniata River.</i>								
Huntingdon, Pa.	80	24	4.0	19, 23, 29	2.8	10-18	3.1	1.2
<i>W. Br. of Susquehanna.</i>								
Williamsport, Pa.	35	20	4.8	30	0.7	6-9	1.5	4.1
<i>Waccamaw River.</i>								
Conway, S. C.	40	7	2.2	7, 30	0.6	26	1.6	1.6

*Distance to the Gulf of Mexico. †Record for 28 days

SPECIAL CONTRIBUTIONS.

RECENT PUBLICATIONS.

By HERMAN W. SMITH, Librarian, Weather Bureau.

British Empire.

England.

Meteorological Council. Daily weather report from January to December, 1896, in 2 Vols. London, 1897. 4to. 1,460 pp.

Meteorological Council. Hourly means of the readings obtained from the self-recording instruments at the five observatories under the Meteorological Council, 1893. London, 1896. 4to. ix, 140 pp.

Meteorological Council. Meteorological observations at stations of the second order for the year 1892. London, 1896. 4to. 184 pp. 1 map.

Meteorological Council. Meteorological observations at stations of the second order for the year 1893. London, 1897. 4to. 184 pp. 1 map.

Meteorological Council. Monthly current charts for the Atlantic Ocean. London, 1897. 22 by 18, 6 charts 22 by 36.

Meteorological Council. Report of the International Meteorological Conference. Paris, 1896. London, 1897. 8vo. 90 pp.

India.

Eliot, J. Indian meteorological memoirs. Vol. VII, Observations at Trevandrum. Part VI. Wind Direction. Simla, 1896. Fol. 144 pp.

Eliot, J. Indian meteorological memoirs. Vol. VIII, Observations at the Agastia observatory. Part I. Pressure, temperature, vapor tension, humidity, direction and force of wind, clouds, and temperature of evaporation. Calcutta, 1897. Fol. XI. 234 pp.

East Indies.

Max Simons, M. D. Annual report on meteorological observations in the Straits Settlements for the year 1896. Singapore, 1897. Fol. 76 pp.

German Empire.

Saxony.

Jahrbuch der Erfindungen und Fortschritte auf den Gebieten der Physik, Chemie, und chemischen Technologie, der Astronomie und Meteorologie. Jahrgang XXXIII. Begründet von H. Gretschel & H. Hirzel. Leipzig, 1896. 12mo. 380 pp.

Hawaiian Republic.—Hawaiian Weather Bureau. Weather record for Honolulu and the Hawaiian Islands 1894-95. Curtis J. Lyons, Director. Honolulu, 1897. 8vo. 75 pp.

Japan.—Results of the hourly meteorological observations for the lustrum 1891-1895, Meteorological Stations, Sapporo, Japan. Tokio, 1896. 4to. 91 pp. 15 plates.

Annual Report of the Central Meteorological Observatory of Japan for the year 1893. Part II. Memoirs. Tokio, 1896. 4to. 274 pp. 119 plates.

Norway.—Jahrbuch des Norwegischen Meteorologischen Instituts für 1896. Dr. H. Mohn, Director. Christiania, 1897. 4to. Vol. XII. 120 pp.

United States of America.

California.—Fifth biennial report of the State Board of Horticulture of the State of California, for 1895-96. Sacramento, 1896. 8vo. 161 pp.

District of Columbia.—Bulletin of the United States Fish Commission. Vol. XVI for 1896. Washington, 1897. 4to. 427 pp.

U. S. Department of Agriculture. Report of the Division of Statistics, Nos. 134 to 144. 1896. Washington, D. C., 1897. 8vo. 135 pp.

Yearbook of the United States Department of Agriculture. 1896. Washington, 1897. 8vo. 636 pp.

New York.—Thurston, Robert H. Materials of engineering. Part I, Non-Metallic materials, 364 pp. Part II, Iron and steel, 680 pp. Part III, Alloys, brass, and bronzes, 576 pp. New York, 1893. 8vo.

THE OBSERVATION OF HALO PHENOMENA.¹

(Translated from a separate print from the annual volume of the Natural History Association of Wurtemberg. Communicated by Rev. K. SCHEFFÉ; dated Feb., 1897.)

The light from the sun, moon, and brighter stars, by means of refraction through or reflection on ice crystals—when the latter occur in great numbers, in definite positions, over a considerable region—manifests itself in figures of manifold forms, known as halo phenomena. These are very seldom observed in crystals of ice that lie upon the surface of the earth; more frequently, but still rarely, in those crystals that float in the atmosphere in the immediate neighborhood of the observer so that, for instance, they rarely develop between the observer and any distant object. As a rule, and, indeed, by no means so rarely as is ordinarily thought, halos occur in the clouds or haze of ice crystals at different altitudes in the atmosphere, but above the observer's head. The most frequent form of halo is a circle around the star whose light produces it, having a radius of about 23°; that is to say, the line from the eye to the star makes an angle of about 22° to 23° with the line from the eye to the circle. The circle shows the colors of the rainbow, beginning with red on the inside of the circle (in contrast to the rainbow, where the red is on the

¹The Chief of the Weather Bureau has just received from Rev. K. Schipps, of Baustetten, near Laupheim, Wurtemberg, Germany, a letter requesting the cooperation of those interested in the study of halos. A committee for this purpose has been formed in Germany, on behalf of which Mr. Schipps has issued a circular, which we translate herewith, and which will be found instructive as a guide to both observers and students.